City of Chicago
Richard M. Daley, Mayor

Office of Emergency Management and Communication

José A. Santiago
Executive Director

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THE OFFICE OF THE EXECUTIVE DIRECTOR

July 15, 2010

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Chicago, Illinois Interoperability Showing
PS Docket No. 06-299: In Support of Request For Conditional Waiver

Dear Sir or Madam:

In accord with the Commission's decision in In the Matter of Requests for Waiver of Various Petitioners to Allow the Establishment of 700 MHz Interoperable Public Safety Wireless Broadband Networks, *Order*, PS Docket No. 06-229, FCC 10-79 (released May 12, 2010) ("*Order*") at ¶¶ 36-61, the City of Chicago, Illinois hereby submits its Interoperability Showing, addressing all matters requested by the Bureau within its subsequent *Public Notice* arising out of the *Order*.

Chicago respectfully requests that ERIC find that the Interoperability Showing is fully consistent with the decisions and directions of the Commission contained within the Order, and that ERIC recommend the grant of Chicago's request for waiver of the Commission's Rules to allow Chicago to commence the planning and deployment of 700 MHz facilities as a portion of the Commission's efforts to cause the creation of a nationwide public safety interoperable network.

Sincerely,

José A. Santiago, Executive Director
THE OFFICE OF EMERGENCY MANAGEMENT AND COMMUNICATIONS

NEIGHBORHOODS Alive!
BUILDING CHICAGO TOGETHER

CHICAGO WORKS TOGETHER

Executive Summary

This interoperability showing is prepared in conformity with the mandates of the Federal Communications Commission within In the Matter of Requests for Waiver of Various Petitioners to Allow the Establishment of 700 MHz Interoperable Public Safety Wireless Broadband Networks, *Order*, PS Docket No. 06-229, FCC 10-79 (released May 12, 2010) ("*Order*") and 700 MHz Waiver Order, PS Docket 06-229, *Public Notice*, DA 10-923 (released May 21, 2010). Although Chicago recognizes that its deployment of a 700 MHz network must be consistent with the technical standards and conditions created by the Emergency Response Interoperability Center (ERIC) for the construction and operation of its 700 MHz network to promote and enhance a nationwide broadband interoperable public safety network, this showing is intended to demonstrate fully Chicago's good faith efforts to demonstrate compliance with those standards that currently exist in accord with the *Order*.

As ERIC is aware, all interested public safety entities are presently responding to the *Order* in making decisions regarding specific vendors for the purpose of design and deployment of LTE systems. Until the publication of the *Order*, interested public safety entities would have been hard pressed to create the necessary technical components of Requests For Proposal, to identify specific vendors pursuant to procurement statutes. Additionally, until a public safety entity is provided authority to commence activities, investment in specific technologies would have been needlessly at risk. Although Chicago is fully committed to this process and the deployment of its LTE network, Chicago is not able to specifically identify the vendor for any equipment that will be

deployed. Rather, Chicago will identify herein those baselines and equipment specifications, etc., that will be incorporated into an RFP following grant of Chicago's conditional waiver and entrance into a spectrum lease with PSST, as approved by the FCC.

The above considered, Chicago's interoperability showing will present the required data and approach to assure ERIC and affected public safety entities that Chicago is prepared and supports the creation of a fully interoperable nationwide broadband network. Chicago believes that its participation in deployment of the nationwide network is essential given its status as one of the most populous cities in the United States, which public safety communications affect the lives and safety of over 9.7 million people living in the Chicago Metropolitan Area.

In accord with the *Order*, Chicago proposes to deploy an LTE air interface in accord with the 3GPP Standard, Evolved Universal Terrestrial Radio Access ("E-UTRA"), Release 8. Descriptions of the Evolved Packet Core and the technical specifications to be required are included, as well as data and specifications related to the deployment of the Radio Access Network Architecture, to the extent that is reasonable and possible given the fact that a specific vendor has not yet been selected pursuant to procurement statutes. This interoperability showing also provides data related to interfaces, which will address the means of handoff and VPN connectivity in a mobile environment. As expected, this interoperability showing will also address roaming capability, to provide access to adjacent and far jurisdictions based on the common interface and accessibility achieved via design criteria.

The means of achieving acceptable guidelines for priority access and QoS standards are deemed an important element of system design and deployment, to assure that the operational characteristics of Chicago's network are fully responsive to the needs of public safety communications in a fully interoperable environment. Finally, the interoperability showing will address security, including those features from the 3GPP Release 8 LTE as mandated by the *Order*.

The specifications for the planned devices will be based on technical data available from the myriad sources that have participated in this effort to date, however, Chicago's showing will not be vendor specific due to the fact that the procurement process has not been completed. The foregoing addresses the essential technical considerations found in this interoperability showing.

However, since the deployment and use of the proposed 700 MHz network will depend on other relevant factors, this showing will describe the applications to be delivered via deployment, and the means of assuring that the system is sufficiently robust or redundant to make reasonably certain that the applications are fully available upon demand by subscribers. Such further tasks as RAN planning to meet coverage and capacity needs; interference coordination with other agencies; and other RF engineering issues are also considered.

The remainder of this showing will address the logistical elements of testing, deployment and maintenance. Although much of this portion will require estimations, Chicago is confident that its estimates will be realistic, based on its past experience in deploying multiple-site data systems to serve the same geographic area and core group

of subscribers.

Chicago avers that this Interoperability Showing is fully consistent with and complies with all mandates within the *Order* and the Public Notice referenced above. The specificity of the data contained herein demonstrates fully Chicago's ability and willingness to move forward toward planning, procurement and deployment of its 700 MHz network, to create an interoperable partner with all other jurisdictions that seek to knit together a seamless LTE system to serve public safety agencies nationwide.

Chicago respectfully urges ERIC to accept and approve this Interoperability Showing in support of grant of a conditional waiver, to allow Chicago to invest in the future of interoperable broadband public safety radio communications.

Interoperability Components

The purpose of the City of Chicago's Interoperability Showing is to demonstrate sufficient details on the design, construction and operation of the 700 MHz Wireless Broadband Public Safety Network to achieve operability and interoperability given the constraints that the design has not been finalized. This section is organized in accordance with the guidance provided by the FCC in Public Notice DA 10-923 released May 21, 2010.

System Architecture

The City of Chicago will construct a 700 MHz Wireless Broadband Public Safety Network based upon the technology specified and the stated goals of the Federal Communications Commission;

- The system will be based upon Long Term Evolution (LTE) technology consisting of a Radio Access Network (RAN) and an Evolved Packet Core (EPC).
- The system will support interfaces that are in compliance with 3GPP Release 8 of the LTE standard.
- The system will support roaming from other regional public safety broadband networks.
- The system will implement protocols for priority access and quality of service (QoS).

- The system will implement security features such as encryption, authentication, authorization and identification using the security features within the 3GPP Release 8.
- The system will be compliant and consistent with the goal of seamlessly integrating this network into the nationwide interoperable public safety network.

This Interoperability Showing includes relevant drawings to depict the proposed configuration of the Chicago network, however, specific data regarding backhaul and connectivity will arise out of later system design functions. At this juncture, the City anticipates that most backhaul functions will be provided via existing fiber, augmented by microwave where necessary and appropriate.

Radio Access Network (RAN) Architecture

The Radio Access Network (RAN) shall be designed to provide a robust and comprehensive system providing a complete footprint of coverage for the City of Chicago. Along borders with other jurisdictions, the antenna design will be such as to reduce or eliminate interference with any future systems. In order to provide complete coverage and maximum bandwidth to users, the proposed system will be a 6 sector system (antenna arrays configured in a hexagon as opposed to the typical commercial network triangular configuration). The proposed network will use existing public safety towers and roof top sites. The City will integrate the existing internet access into the new system using fiber and microwave. The 6

sector design will maximize the system's throughput of data. As with all wireless systems, the data throughput is at its highest rates near the antennas and falls off as you move to the edge of the coverage area. Each node would be designed to insure low latency and high efficiency for uplink and downlink speeds. Sites will be strategically located to insure complete coverage and signal penetration into buildings and underground facilities. The site placement and antenna design will ensure the highest data rates possible to maintain fidelity for such bandwidth gluttons as streaming video. The network will operate on the 763-768/ 793-798 MHz band under a spectrum lease from PSST. At this time, Chicago has not identified any non-LTE based or commercial LTE network systems that would interface with the City's system.

In designing a wireless communication network the density of sites for a given area, the site locations, and antenna design depend upon two factors; topology and morphology. The City of Chicago has seven different kinds of topologies. The topology designations reflect specific characteristics involving area land uses, densities and the local environment.

The seven topologies are:

- Downtown Core – High Density, central business district
- Major Activity Center – Areas with a wide range of densities
- Local Activity Center – Areas with identifiable neighborhoods

- Dense Urban Neighborhood- Multi-family residential areas with supportive retail
- Urban Neighborhood – Mixed density residential areas with supportive retail
- Service Employment District- Areas dominated by large employers and institutions
- Manufacturing Employment District – Characterized by large low density buildings.

Morphology

Morphology is a way of classifying certain combinations of terrain and clutter. The classification is the means used to estimate path loss and determine the effective range of network nodes. The actual effect of morphology on the RF range is estimated based on empirical measurements. RF planning and propagation software is used to calculate the required network deployment density.

The City of Chicago uses three different classifications of morphology:

- Urban – Built up areas consisting of mixed office and apartment buildings with a height of 10 stories or higher. Path loss in this category is considered to be high. The design considerations are the same as those in the urban core setting. Their impact to network performance is of a lesser degree.

- Suburban – Typical residential areas, as well as low density commercial/retail and office building of 1 to 3 stories. Path loss is considered moderate. Design challenges in suburban areas include availability of tower infrastructure and foliage.

- Rural – Open areas with minimal building obstructions such as agricultural areas. Path losses in an open area are classified as low. The path losses for rural designated areas that are not agricultural, or open, are more difficult to determine. For this reason it is necessary to survey the area to assist in determining the path loss.

The above morphologies are impacted by the following:

- Terrain – This can have a considerable impact on link quality. Consideration must be given to changes in elevation in the service area and installation of radio nodes. The City of Chicago borders Lake Michigan which introduces more difficulty in system design due to the long-range propagation effects over water. Special consideration in the design insures that the signal is controlled and provides even coverage and protection to other potential users in the general area.

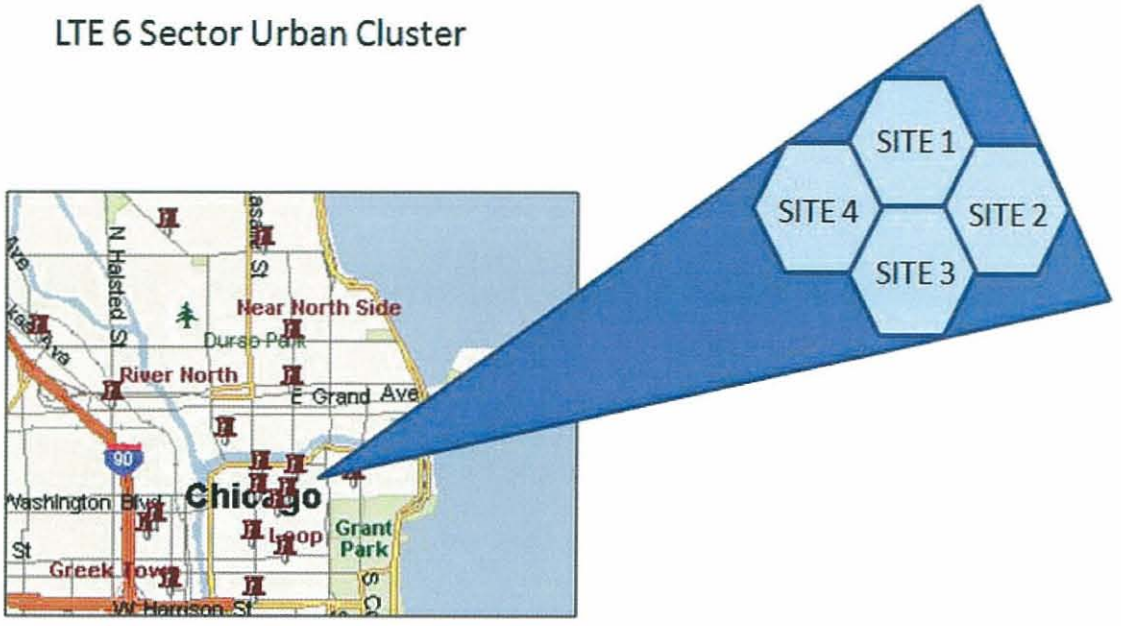
- Clutter – As it relates to the RF signal is the obstruction of line-of-site (LOS) between the User Equipment (UE) and the base station resulting in attenuation of the RF signal. This attenuation will occur because of diffraction, absorption, and reflection.

Preliminary Node/Transmitter Sites

The City of Chicago network design has not been finalized; however, given the topology and morphology of the City of Chicago and the coverage and reliability requirements placed upon a public safety grade network, preliminary studies indicate that 220 node/transmitter sites are required. The following maps depict locations of these sites and an example of the complexities of meeting coverage and reliability requirements in the downtown core.

City of Chicago

LTE 6 Sector Urban Cluster




DeLorme Street Atlas USA® 2009
City of Chicago Sites
Initial Phase
Barrington
Buffalo Grove
Wheeling
Palatine
Prospect Heights
Rolling Meadows
Arlington Heights
Mount Prospect
Glenview
Golf
Morton Grove
Skokie
Hoffman Estates
Schaumburg
Streamwood
Des Plaines
Niles
Park Ridge
Lincolnwood
Elk Grove Village
Roselle
Medinah
Itasca
Wood Dale
Bloomingdale
Bensenville
Schiller Park
Harwood Heights
Addison
Franklin Park
River Grove
Elmwood Park
Carol Stream
Glendale Heights
Elmhurst
Stone Park
River Forest
Melrose Park
Oak Park
Villa Park
Bellwood
Maywood
Lombard
Hillside
Forest Park
Winfield
Wheaton
Broadview
Hines
Berwyn
Cicero
Westchester
Riverside
Oak Brook
Brookfield
Warrenville
Downers Grove
La Grange
Lyons
Western Springs
Lisle
Westmont
Hinsdale
Summit
Naperville
Bedford Park
Woodridge
Darien
Justice
Bridgeview
Willow Springs
Burbank
Hometown
Hickory Hills
Oak Lawn
Evergreen Park
Bolingbrook
Palos Hills
Chicago Ridge
Worth
Lemont
Palos Park
Alsip
Blue Island
Romeoville
Robbins
Riverdale
Orland Park
Midlothian
Posen
Dolton
Calumet City
Harvey
Homer Glen
Oak Forest
South Holland
Lockport
Orland Hills
Hammond
Tinley Park
Hazel Crest
Country Club Hills
Thornton
Lansing
Munster
Homewood
Flossmoor
Glenwood
Mokena
New Lenox
Olympia Fields
Matteson
Frankfort
Park Forest
Dyer
Richton Park
Steger
Lake Michigan
Lake Calumet
Whiting
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Data Zoom 9-3

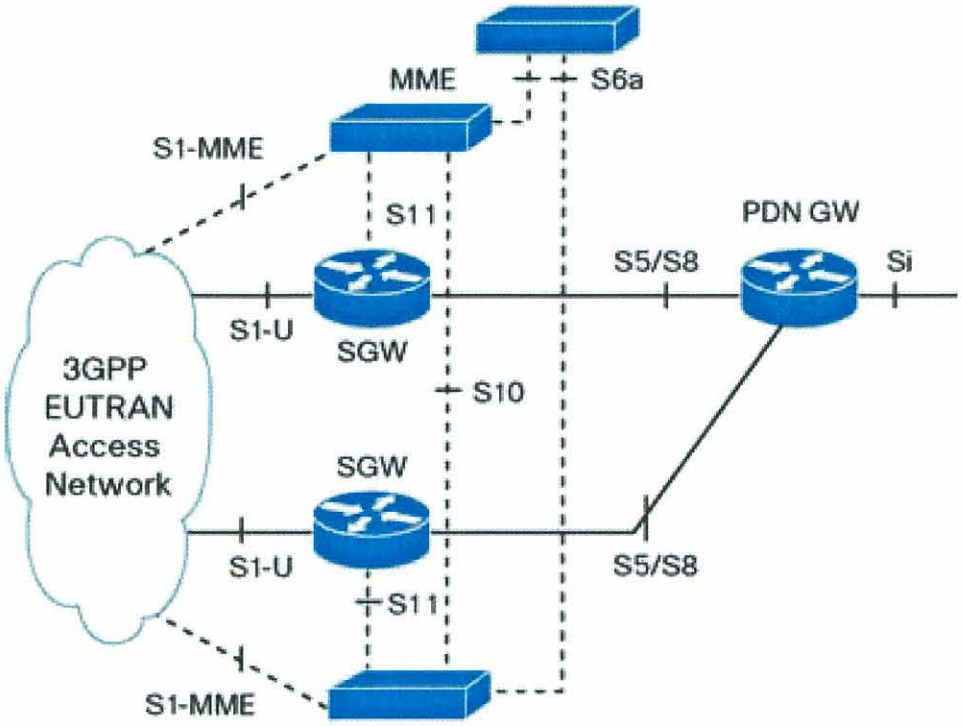
Core Network Architecture

The Core Network Architecture proposed by Chicago is fully consistent with the *Order* and the Public Notice, i.e. 3rd Generation Partnership Project (3GPP) which was originally created to facilitate a globally applicable third-generation mobile phone system. As ERIC is aware, GPRS, EDGE and UMTS came out of the project. In 2001, the project changed its focus to an all IP (internet protocol) Core Network. In 2002 HSDPA (High Speed Downlink Packet Access) was introduced. In 2004, Wireless LAN was integrated and HSUPA (High Speed Uplink Packet Access) was added. In 2008, the first LTE specification was released (release 8), an IP based network using OFDMA (Orthogonal Frequency Division Multiple Access), FDE and MIMO based radio interface.

3GPP's Evolved Packet Core

As part of 3GPP Release 8, the Evolved Packet System architecture makes up the Evolved Packet Core, known as the EPC of the system. The EPC is an end to end architecture to support mobile access networks. The Evolved Packet System is divided into a radio access network known as the E-UTRAN and a core network know as the EPC. The E-UTRAN consists of eNodeBs, which provide the radio interface with the end user equipment. The eNodeBs are connected to each other via an IP based interface and toward the EPC via an IP based S-1 interface. (see figure 1)

Figure 1. 3GPP Release 8 Evolved Packet Core



Cisco Systems

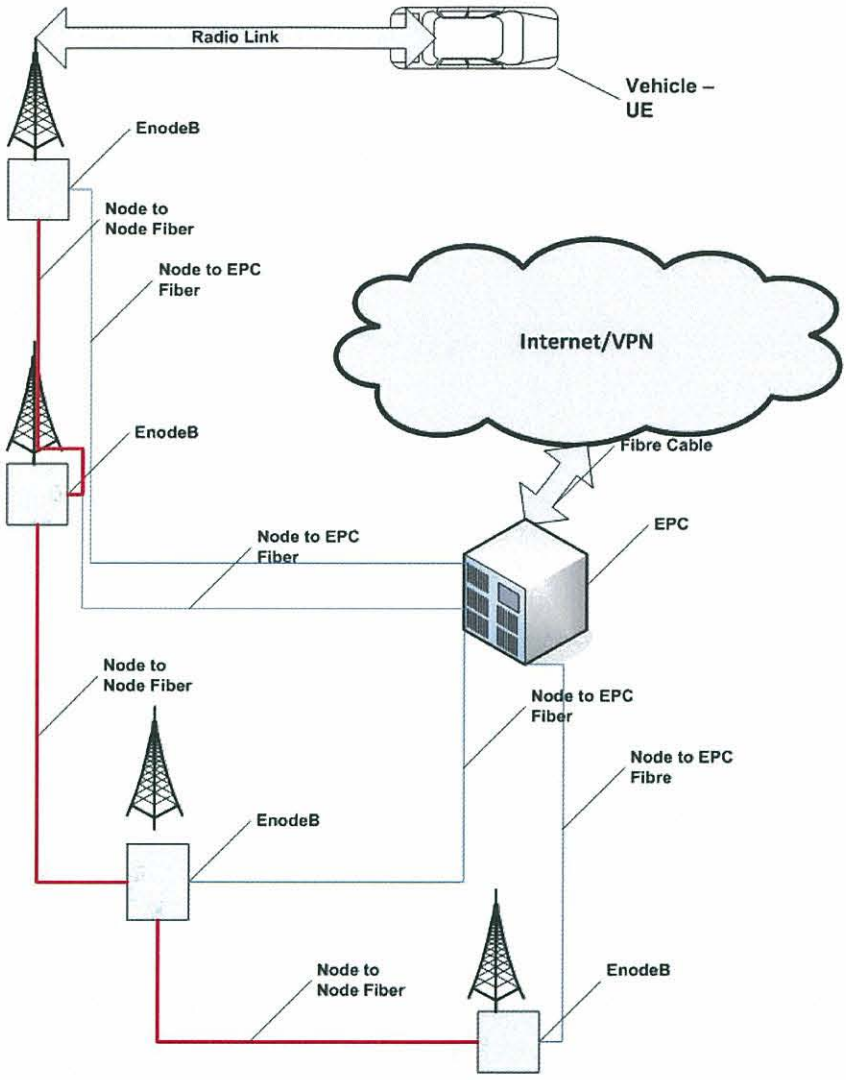
This architecture allows for the following data specifications:

- 100 Mbps downlink and 50 Mbps uplink peak data rates
- Low control plane latency (less than 50 ms from idle to active)
- Low user plane latency (less than 5 ms for small packets)

As can be seen in figure 1, there are data paths between the eNodeB and the Serving Gateway (SGW). This is known as a S-1 bearer.

The datapath that connects the Serving Gateway (SGW) and a Packet Date Network Gateway (PDN GW) is known as a S5 bearer.

A diagram of the Chicago Network configuration is provided below.



City of Chicago LTE System Diagram

Showing typical arrangement for 4 of the 220 sites.

Legend:

UE- a mobile unit within the system

ENodeB- a 700 MHz base station

EPC- the Evolved Packet Core

VPN – the secure network the City uses to communicate between users.

Interfaces

The following interfaces, as part of 3GPP Release 8, will be supported by the proposed system:

- Uu – LTE air interface
- S6a – Visited MME to Home HSS
- S8 – Visited SGW to Home PGW
- S9 – Visited PCRF to Home PCRF for dynamic policy arbitration
- S10 – MME to MME support for Category 1 handover support
- X2 – eNodeB to eNodeB

Interoperability Testing must be performed on the following 3GPP Release 8 (LTE) interfaces:

- S1 – MME (interface between eNodeB and MME)
- S1-u (interface between eNodeB and SGW)
- Uu – LTE air interface

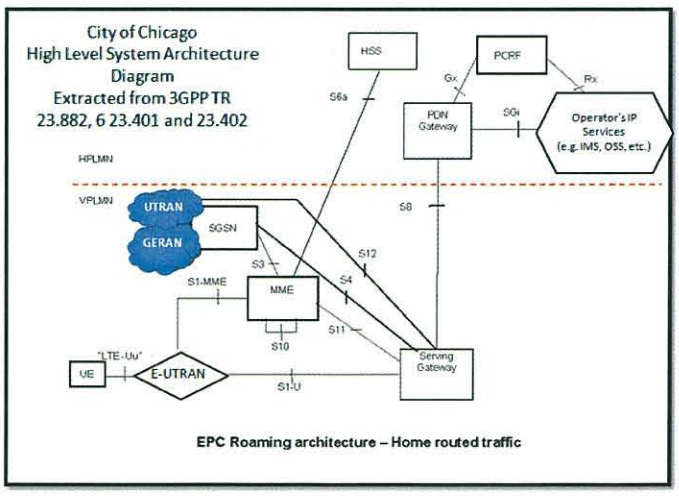
As previously stated, this is not a vendor specific proposal. Therefore, the City of Chicago, as part of its bid process, will require all vendors to provide proof that all interfaces are fully compliant and have passed all certification process required by the FCC, and the BBTF and/or ERIC.

The system Chicago is proposing has been designed to meet the 3GPP Release 8 specifications for high speed (75 MPH) mobility and seamless handoffs. As can be seen in the previous section on the RAN, the system design will require 220, 6 sector

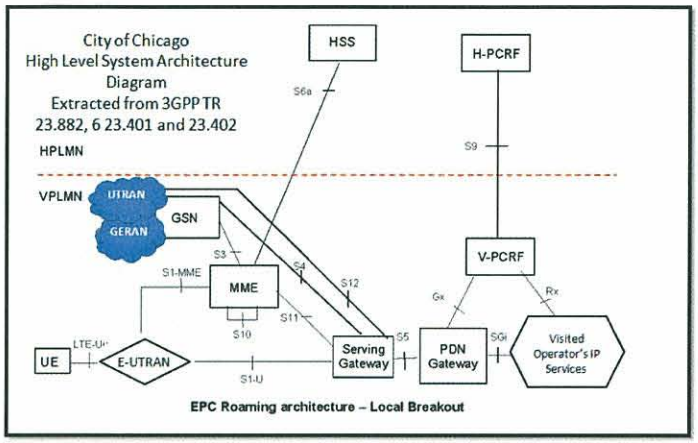
sites within the City of Chicago to achieve this requirement. The system design accounts for and assumes that vehicles will be moving from EnodeB to EnodeB and will be done in a seamless manner. When moving into another jurisdiction, the UE becomes a roamer. Since the FCC has mandated that all systems be 3GPP, release 8, LTE systems, the adjacent architecture should allow an authorized roamer to seamlessly enter their system. Since all proposed interfaces are fully compliant with 3GPP Release 8 of the LTE standard, the proposed interfaces should promote interoperability by creation of consistent operations across near and far-jurisdictions during and following the creation of the nationwide network.

Roaming

In order to achieve the FCCs goal of constructing a nationwide interoperable public safety communication network, seamlessly roaming between networks is imperative. 3GPP, Release 8, has a specific architecture for roaming that will be included as an integral part of the Chicago network. This architecture is illustrated below.



A roaming user's equipment (UE) needs two things when roaming. (1) access to their home system, (2) and access to the local system and the internet. The 3GPP Release 8 architecture will provide a roamer with both of those.



The City of Chicago will enter into Roaming Agreements with all jurisdictions once they have compatible systems in place. All such Roaming Agreements will be in writing and will be provided to ERIC or such other clearinghouses as the FCC may designate. It is again noted that Chicago's present design does not presently provide roaming to and from commercial networks, however, such roaming is not rejected and all avenues of service must be explored to determine the means of reaching public safety's goals in this effort.

Priority access and QoS

The City of Chicago currently utilizes the following wireless data applications using disparate networks both private and commercially owned . These applications will be the first to migrate onto the new network. They include:

- Computer Aided Dispatch
- Case reporting/records management
- Automated Ticket Writing
- Queries
  - License Plate
  - Warrants
  - Mapping
  - Blueprints/contents/hazardous chemicals
- Police Observation Device (POD) surveillance camera video
- PDA's for building inspections
- GPS
- EMS patient data through hospital links
- Streaming video for First Responders
- License Plate Recognition
- In-Car Camera Video

The proposed system design would have a priority component that is dynamically set by the Network Operations Center. Every UE would be provided a priority level from

Highest (1) to Lowest (10) that is determined by the function of the user during normal, alert, and emergency situations. The Network Operations Center will have the ability to alter priority levels for specific groups, departments, or individuals at any time. For example, during an emergency, First Responders would have top priority and would have the ability to use the maximum bandwidth available on the system during the emergency. As the nature of the emergency is assessed and the On-Scene Commander determines that building blueprints are required, the NOC would grant top priority to the City Engineer to download the blueprints and deliver them to the scene. The priority system to be implemented will be confined to the City of Chicago's system and will have no impact on a nationwide system.

As ERIC knows, the Quality of Service (QoS) in networking refers to resource reservation control mechanisms rather than the achieved service quality. QoS is the ability to provide different priority to different applications, users, or data flows. In previous versions of 3GPP, the core system provided a Quality of Experience. This has been adequate for most services and users to date; however, the demand of a Public Safety Grade Network required that Quality of Service capabilities become inherent in the system. 3GPP, release 8 standardized QoS concepts that will provide the Chicago Network Operations Center a set of tools to assign specific users and applications the priority and bandwidth required for the most efficient deployment of resources (both personnel and network bandwidth).

Security

The specifications for the EPC in 3GPP, Release 8 provides for an excellent security system. Basically, every UE has an ID. When it accesses the system through the EnodeB, the EPC verifies that it is an authorized UE. Additionally, the EPC contains keys that are not accessible from the outside. The EPC takes the UE ID and an EPC key and generates a session key for the UE to use and gain access to the system. If it is a roaming UE, the device must be on an authorized list, but the EPC still checks that the UE's ID is valid by checking the home system for verification.

Devices

The City of Chicago has not selected any devices or a particular vendor to supply devices. Device selection will be based upon end users needs, the vendor's ability to meet industry standards for technology, and the rugged demands of public safety environments. To assure that the devices and manufacturers meet or exceed whatever standards evolve in the creation of the nationwide network, all device manufacturers must participate in that testing described herein below. Additionally, the consideration of future devices must include the ability to make future upgrades to assure that as standards evolve, those devices might have the capacity to meet those anticipated standards or goals.

Applications

The City of Chicago's Network will support the following applications:

- Internet access
- VPN access to any authorized site and to home networks
- a status or information "homepage
- access to responders under the Incident Command System
- field-based server applications including:
    - Computer Aided Dispatch
    - Case reporting/records management
    - Automated Ticket Writing
    - Queries
        - License Plate
        - Warrants
        - Mapping
        - Blueprints/contents/hazardous chemicals
    - Police Observation Device (POD) surveillance camera video
    - PDA's for building inspections
    - GPS
    - EMS patient data through hospital links
    - Streaming video for First Responders
    - License Plate Recognition (LPR)
    - In-Car camera video

Reliability and Availability

The City of Chicago's design philosophy for maximizing reliability and availability is "Defense In Depth". Defense In Depth (DID) imposes three layers of defense (normal, backup, and emergency) for every attribute of the network that could cause the network to fail. For example, transmitter equipment power. Every transmitter will have:

1. normal electrical power (grid)
2. backup eight hour uninterruptable power supply (battery)
3. emergency generator power with 48 hour fuel capacity (generator)

The DID three layer design methodology is depicted further in the below table:

Network Attribute	Normal	Backup	Emergency
Transmitter Power	Grid	Battery	Generator
Tower Site	Normal	Six Sector Antenna Design	Adjoining Densely Packed Sites
Backhaul	Fiber	Fiber Ring	Microwave
Network Operations Center	OEMC	Police Headquarters	One of Eight NOCs
Servers	OEMC	Police Headquarters	One of Eight NOCs

Interference Coordination

The City of Chicago acknowledges the fact that public safety agencies will share the spectrum allocated and will take on a leadership role in the area to facilitate advanced planning and post-launch operational coordination to ensure that interference between agencies is minimized. Chicago will adhere to the FCC's common methodology for coordination in the case where adjacent jurisdictions utilizing the public safety broadband spectrum build out local networks. Before deployment, the City of Chicago will coordinate and address interference mitigation needs with any adjacent or bordering jurisdictions that also plan deployment; and, will continue to coordinate with jurisdictions that deploy in the future. This activity will be performed in cooperation with the State of Illinois and the City's present role in assisting in frequency coordination and interference mitigation.

Testing

A detailed initial and long term testing plan will be developed as part of the network bid process. The City of Chicago will require that all vendors that desire to bid upon the Chicago Network project must actively participate in the PSCR/DC Demonstration Network by providing their equipment for evaluation under the NIST test plan.

As part of the bid specification, the City of Chicago will require that Interoperability Testing (IOT) be performed on the following 3GPP Release 8 (LTE) interfaces:

- S1-MME (interface between eNodeB and MME)
- S1-u (interface between eNodeB and SGW)
- U_u- LTE air interface

As part of the bid specification, the City of Chicago will require that Standards Conformance Testing be performed based on 3GPP test suites that are developed by the PCS Type Certification Review Board.

Deployment

The Network will be designed to cover the entire geographic area within the boundaries of the City of Chicago. The design and construction of the Chicago network will proceed through the following phases:

- Design Engineering Firm Selection
- Network Project Management Firm Selection
- Network Design
    - Initial Design
    - Design Review Board
    - Final Design
    - Final Design Approval
- Network Bid
- Vendor Selection
- Construction and Testing
    - Four phases of construction/testing

The deployment schedule is provided in Exhibit 1.

Although Chicago invites and would willingly cooperate with other network providers to expand upon the capacity and geographic coverage of the Chicago network, Chicago has not now identified any network providers for such purpose.

Operations, Administration and Maintenance

Operations

In keeping with the defense in depth design methodology described earlier, the City of Chicago will deploy the main Network Operations Center (NOC) at the Office of Emergency Management and Communications (OEMC), the backup NOC at Ohare Backup Center, and six emergency NOCs at six undisclosed locations. Chicago will deploy mirrored server architecture slaving all servers to the master OEMC servers to ensure that any fault or failure can occur without any downtime of the NOC. The main OEMC NOC and the backup Ohare NOC will be staffed 24/7/365. The six emergency NOCs will be staffed on a graduated risk assessment protocol. As the risk level increases the time to staff an emergency NOC decreases.

As discussed earlier, security, priority and quality of service capabilities are inherent in 3GPP, Release 8. Chicago will take full advantage of this technology and the NOC will be responsible for setting user security, priority, and QoS depending upon the level of risk and demand on the network.

Network Interoperability

The City of Chicago Office of Emergency Management and Communications (OEMC) is already the hub for the county, state, and several federal law enforcement network interactions. The logical and therefore most efficient next step is to have the OEMC be the interface for any data interoperability that is required; thus, all future interoperability expansions become an exercise in network routing rather than expensive hardware purchases.

At this juncture Chicago does not envision any technical or operational issues associated with interoperability as the nationwide network is constructed as long as adequate spectrum is allocated as the number of users expands.

Administration, Maintenance, and Provisioning

The City of Chicago Office of Emergency Management and Communications (OEMC) operates one of the nation's largest 911 centers. Procedures and policies are already in place to operate and maintain multiple wireless and wired emergency and non-emergency networks. The operation and maintenance of the 700 MHz Broadband network will be melded into the existing administrative and organizational structure of the OEMC.

Administration of the devices and the system would operate very similarly to how the OEMC currently operates. Assets are entered into the existing asset management database and work orders are generated for repairs. The negotiated contractual mechanisms and service level objectives would determine what procedures would be followed to facilitate repairs. Portable device provisioning and administration will be managed via the existing Network Management Center (NMC) helpdesk protocols. Existing protocols would be amended to allow the NMC help

desk training and access for provisioning of devices. A single System Administrator, with a staff of no less than five network experts with wireless backgrounds would be hired and trained to manage the system. Existing device request procedures would be followed as well as standard user accounting policies and procedures would be utilized.

The OEMC already manages over 1,000 miles of fiber in the ground throughout the City with a robust infrastructure construction and repair organization that has been in place for 15 years. The OEMC would continue to utilize existing fiber support contracts to ensure wireline infrastructure is well maintained (as it is already today). Additionally, the OEMC would utilize existing maintenance contracts and agreements for radio tower infrastructure maintenance; while exploring new opportunities for leasing arrangements with 3rd party tower suppliers. End point wireless infrastructure would be maintained by the winning bidder and support SLA's would be negotiated via the contract process. The existing OEMC radio field crew that maintains the existing public safety voice and data radio systems would be augmented with additional personnel and utilized to support any negotiated support agreements with the selected equipment suppliers. OEMC also operates a large radio installation shop that currently handles all of the data radio systems and vehicular installation for the Chicago Police and Fire Departments. Those personnel would also take control of the deployment and maintenance of mobile assets; similar to how they operate now. Additionally, the OEMC has contracts in place for vehicle equipment installation that could be leveraged.
OEMC currently maintains a large fleet of mobile devices. All mobile devices deployed on the LTE network would be managed and maintained using the current processes and procedures.

City of Chicago

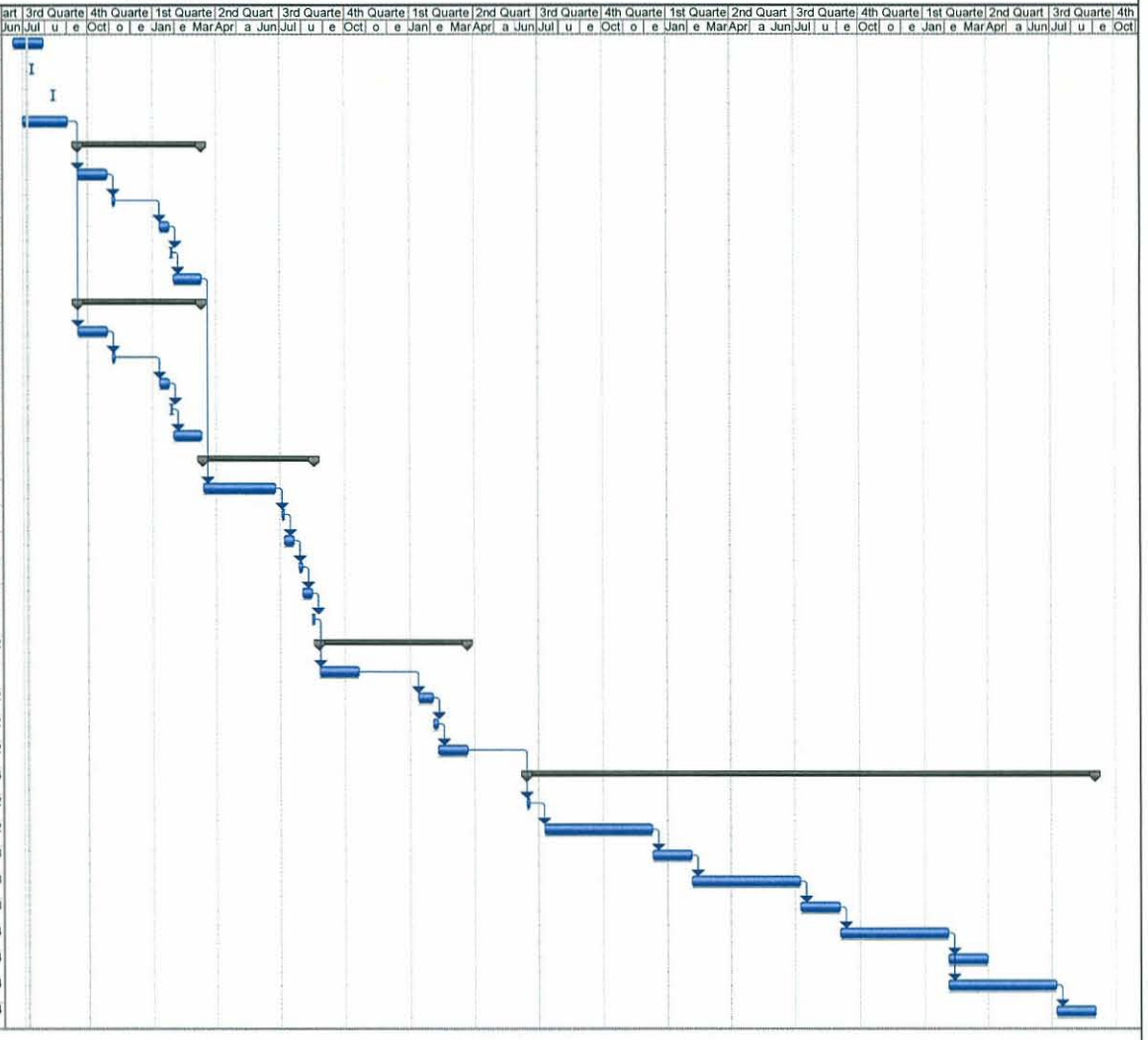
Interoperability Showing

Exhibit 1

Deployment Schedule

City of Chicago
700 MHz Broadband
Public Safety Network
Deployment Schedule

ID	Task Name	Duration	Start	Finish
1	Request for Waiver Granted	31 days?	Fri 6/18/10	Fri 7/30/10
2	Interoperability Showing Submitted	1 day?	Wed 7/14/10	Wed 7/14/10
3	Lease Agreement Executed	1 day?	Fri 8/13/10	Fri 8/13/10
4	NTIA Grant Approval	46 days?	Thu 7/1/10	Thu 9/2/10
5	**Design Engineering Firm Selection**	**126 days**	**Fri 9/17/10**	**Fri 3/11/11**
6	Prepare RFQ for Network Design	30 days	Fri 9/17/10	Thu 10/28/10
7	Issue Network Design RFQ	2 days	Fri 11/5/10	Mon 11/8/10
8	Review and evaluate Network Design Quotes	10 days	Tue 1/11/11	Mon 1/24/11
9	Select Network Design Vendor	2 days	Thu 1/27/11	Fri 1/28/11
10	Negotiate and Execute Contract	30 days	Mon 1/31/11	Fri 3/11/11
11	**Project Management Firm Selection**	**126 days**	**Fri 9/17/10**	**Fri 3/11/11**
12	Prepare RFQ for PM Support	30 days	Fri 9/17/10	Thu 10/28/10
13	Issue PM Support RFQ	2 days	Fri 11/5/10	Mon 11/8/10
14	Review and evaluate PM Support Quotes	10 days	Tue 1/11/11	Mon 1/24/11
15	Select PM Support Firm	2 days	Thu 1/27/11	Fri 1/28/11
16	Negotiate and Execute Contract	30 days	Mon 1/31/11	Fri 3/11/11
17	**Network Design**	**114 days**	**Mon 3/14/11**	**Thu 8/18/11**
18	First draft of Network Design	75 days	Mon 3/14/11	Fri 6/24/11
19	Convene Design Review Board	3 days	Mon 7/4/11	Wed 7/6/11
20	Second Network Design	10 days	Thu 7/7/11	Wed 7/20/11
21	Second Design Review Board	3 days	Thu 7/28/11	Mon 8/1/11
22	Final Network Design	10 days	Tue 8/2/11	Mon 8/15/11
23	Final Design Review Board	3 days	Tue 8/16/11	Thu 8/18/11
24	**Network Construction and Testing Firm Selection**	**150 days**	**Fri 8/26/11**	**Thu 3/22/12**
25	Prepare and issue Network Construciton and Testing RFP	40 days	Fri 8/26/11	Thu 10/20/11
26	Review and evaluate Network proposals	15 days	Fri 1/13/12	Thu 2/2/12
27	Select Network construction/testing vendor	5 days	Fri 2/3/12	Thu 2/9/12
28	Negotiate and Execute Contract	30 days	Fri 2/10/12	Thu 3/22/12
29	**Network Construction and Testing**	**577 days**	**Fri 6/15/12**	**Mon 9/1/14**
30	Kickoff Meeting	2 days	Fri 6/15/12	Mon 6/18/12
31	Phase I Construction	110 days	Tue 7/10/12	Mon 12/10/12
32	Phase I Testing	40 days	Tue 12/11/12	Mon 2/4/13
33	Phase II Construction	110 days	Tue 2/5/13	Mon 7/8/13
34	Phase II Testing	40 days	Tue 7/9/13	Mon 9/2/13
35	Phase III Construction	110 days	Tue 9/3/13	Mon 2/3/14
36	Phase III Testing	40 days	Tue 2/4/14	Mon 3/31/14
37	Phase IV Construction	110 days	Tue 2/4/14	Mon 7/7/14
38	Phase IV Testing	40 days	Tue 7/8/14	Mon 9/1/14



Project: Chicago 700MHz Broadband Deployment Schedule
Date: Tue 7/6/10

Task | Progress | Summary | External Tasks | Deadline
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